



OFFICE OF RIVER PROTECTION  
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DEPARTMENT OF ECOLOGY  
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13-TF-0024

MAY 06 2013

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Nuclear Waste Program  
Washington State  
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3100 Port of Benton Blvd.  
Richland, Washington 99354

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Ms. Hedges:

ANALYSIS OF 40 CFR 265.196 REQUIREMENTS FOR DOUBLE-SHELL TANK (DST)  
SYSTEM TANK 241-AY-102, AND DISCUSSION OF *DOUBLE-SHELL TANK*  
*EMERGENCY PUMPING GUIDE*, HNF-3484, REVISION 10

The U.S. Department of Energy, Office of River Protection (ORP) is addressing the requirements found in Code of Federal Regulations (CFR) 40 CFR 265.196(a), (b)(1), and (b)(2) with respect to ORP's determination that Double Shell Tank (DST) 241-AY-102 has leaked from the primary tank into the secondary containment system. 40 CFR 265.196 is titled *Response to leaks and spills and disposition of leaking or unfit-for-use tank systems* and is incorporated by reference into the Washington Administrative Code (WAC) 173-303-400(3)(a). The DST System is currently operating pursuant to the interim status requirements in WAC 173-303-400(3) as acknowledged in the Hanford Facility Resource Conservation and Recovery Act Permit (WA7890008967), Revision 8C, Condition I.A.

Consistent with the *Double Shell Tank Emergency Pumping Guide* and the risk assessed status of the AY-102 Tank condition, continual monitoring and ensuring the equipment to transfer the supernate is prepared and available is the appropriate short term action. Based on a detailed review of the above-mentioned regulations, and current conditions in the tank analysis (attachment 1) ORP is delaying the actions to immediately pump the annulus or primary tank of AY-102.

A number of actions have been discussed and taken through the collaboration of ORP and the Washington State Department of Ecology (Ecology), as members of the AY-102 Integrated Project Team. Attachment 2 outlines some of the actions taken to date.

ORP looks forward to working on resolving the technical and regulatory issues associated with removing waste from Tank 241-AY-102 and making a decision following inspection of the tank on whether to repair the tank or schedule the tank for closure. As agreed to, ORP will provide a 241-AY-102 primary tank pumping plan to Ecology by June 14, 2013, which will include the steps necessary to remove the entire contents of the tank including sludge.

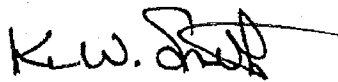
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Jane A. Hedges  
13-TF-0024

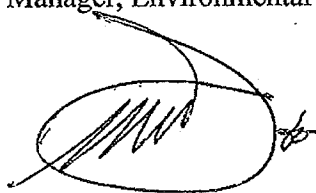
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ORP would like to meet with Ecology in the next few weeks to discuss potential revisions to the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10, and to resolve issues related to use of needed transfer lines within the 241-AY-02A pit.

If you have questions, please contact either of us, or your staff may contact Jeremy M. Johnson on, (509)376-1866, or Steven E. Killoy, Manager, Environmental Protection, WRPS on, (509) 373-5075.



Kevin W. Smith, Manager  
Office of River Protection



Michael D. Johnson,  
President and Project Manager  
Washington River Protection Solutions LLC

Attachment

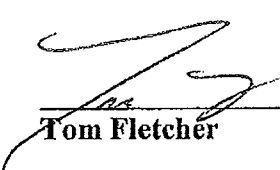
cc w/attach:

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Environmental Portal, LMSI  
Administrative Record: DST  
WRPS Correspondence

**ATTACHMENT 1**

**13-TF-0024**

**ANALYSIS OF THE DOUBLE-SHELL TANK EMERGENCY PUMPING GUIDE, HNF-3484, REVISION 10, ANALYSIS OF 40 CFR 265.196(A), (B)(1), AND (B)(2)**



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**Tom Fletcher**

**PART 1: Analysis of the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10**

History:

*The Double Shell Tank Emergency Pumping Guide*, HNF-3484, has been subject to multiple evolutions since its inception as the result of several interactions with the Washington State Department of Ecology (Ecology) and was tied to resolution of compliance inspection issues that arose in 1998. The 1998 Ecology inspection of the SY Tank Farm resulted in five violations and six concerns. Revision 2 was submitted to Ecology incorporating results of the *Time Deployment Study for Annulus Pumping* to address removal of liquids from secondary containment in Double-Shell Tanks (DSTs) in a timely matter. Additionally, the study would “provide the basis for revising *the Double Shell Tank Emergency Pumping Guide*, as well as scheduling for procurement of emergency pumping equipment and its deployment.” Revision 3 of HNF-3484 closed out the 1998 Ecology inspection and mandated that HNF-3484 “must be kept current.” The current revision, Revision 10, was approved on May 21, 2010, in an Ecology letter titled *Approval of Interim Strategy for Emergency Pumping During 241-SY Tank Farm Transfer Line Upgrades*.

Relevant Content of HNF-3484, Revision 10:

HNF-3484, Revision 10, contains the following information relative to 241-AY-102:

Section 3.2, General Strategy, 6<sup>th</sup> bullet: “About six inches of liquid would need to accumulate in the bottom of the annulus before the submersible pump would automatically prime upon starting.”

Section 3.2, General Strategy, 9<sup>th</sup> bullet: “A pumping strategy plans to use submersible pumps in all annulus locations (HNF-4241, [Double Shell Tank Annulus Pumping Alternatives Evaluation]).”

Section 3.3, Potential Leak Scenarios, 4<sup>th</sup> paragraph: “Once a leak has been identified, all transfers of waste into the leaking tank are terminated and the tank is considered out of service until repaired or replaced. During the emergency response period waste will be pumped to below the leak point to allow for inspection of the primary tank. Waste may remain in the tank below the leak point in compliance with WAC 173-303-640(7)(b)(i).”

Section 3.3, Potential Leak Scenarios, 5<sup>th</sup> paragraph: “Traditional vertical turbine pumps will be used for pumping the primary tank contents. A submersible pump will be used for pumping in the secondary containment. Alternate strategies were evaluated in HNF-4241. A submersible pump will be installed 2.5 inches above the bottom of the secondary containment. This will allow pumping of the waste to within approximately 6 inches of the bottom of the tank. About 2,193 gallons of residual waste would remain in the annulus (See Appendix D [of HNF-3484]). An air pump will also be installed to within 2.5 inches of the bottom of the secondary containment and would be capable of pumping to within approximately 3 inches of the bottom of the tank. Assuming there is no absorption of waste in the insulating concrete, about 3,900 liters (1,030 gallons) of residual waste will remain in the annulus (see Appendix D). Repeated water

flushing could be used as a method to remove the residual waste. Any moisture from the unpumpable residue would be evaporated by the high-efficiency particulate air filtered annulus ventilation system.”

Section 3.3.1, Strategy for Emergency Pumping after a Minor Leak, “Scenario: Primary steel tank corrosion causes small breach. Waste dribbles into annulus and the annulus Continuous Air Monitor alarms. Leak rate is so slow that dried waste will form on the side of the tank. Liquid accumulates in the bottom of the annulus very slowly over a period of weeks or months, if at all.”

Section 3.3.1, Strategy for Emergency Pumping after a Minor Leak, “STRATEGY: Begin pumping primary tank contents via existing underground supernatant transfer pipelines with the existing transfer pump already installed in the central pump pit. In parallel, install and prepare an annulus pump. Identify location of leak point by performing video surveillance of annulus. Continue pumping the primary tank until the waste level is sufficiently below the leak path. When and if pumpable quantities of liquid accumulate in the annulus, the annulus will then be pumped through the annulus pump pit, via the submersible or reciprocating pump, to the designated receiving tanks.”

Section 3.4, Responsibilities, 1<sup>st</sup> paragraph: “Because a leaking tank may constitute a safety issue and an environmental issue, the emergency response must be planned in cooperation with the U.S Department of Energy, Office of River Protection (ORP), Ecology, and the Washington State Department of Health.”

Section 3.6, Estimated time to start pumping tanks, 1<sup>st</sup> paragraph: “To the extent practical, all equipment and documentation necessary to perform emergency transfers from the primary tank and secondary containment systems of the DSTs have been prepared ahead of time.”

Section 3.6, Estimated Time to Start Pumping Tanks, 2<sup>nd</sup> paragraph: “The regulations require removing ‘Spilled or leaked waste and accumulated precipitation...from the primary tank system and secondary containment systems within twenty-four hours, or in as timely a manner as possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated precipitation cannot be accomplished within twenty-four hours.’ In most cases, the nature of the leak will make a 24-hour response impossible.”

### Conclusion

ORP has been and remains in compliance with the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10, since its approval by Ecology on May 21, 2010. The equipment required to close out the compliance inspection was tested and continues to be staged in the event a pumping need arises. However, the scenario presented by 241-AY-102 was not contemplated in the *Double Shell Tank Emergency Pumping Guide*. This specific scenario was not contemplated because it was not anticipated that additional pumping equipment would be needed due to excessive heat or that an annular bottom tank leak would result in waste accumulation that was less than the volume necessary to initiate pumping. Regardless of whether the scenario at 241-AY-102 was contemplated by Ecology and ORP in the *Double Shell Tank Emergency*

[REDACTED]

*Pumping Guide*, the guide recognizes and accepts that pumping is not possible within twenty-four hours from either the primary tank or the secondary containment system.

## **PART 2: Analysis of 40 CFR 265.196(a), (b)(1), and (b)(2)**

Note: Text in brackets indicates a modification to the language from 40 CFR 265.196 as required by WAC 173-303-400(3)(b)(ii) [i.e., changing the word "hazardous" to "dangerous"].

*40 CFR 265.196: Response to leaks or spills and disposition of leaking or unfit-for-use tank systems.*

*A tank system or secondary containment system from which there has been a leak or spill, or which is unfit for use, must be removed from service immediately, and the owner or operator must satisfy the following requirements:*

**Analysis:** The last transfer of waste in or out of 241-AY-102 was documented in *Tank 241-AY-102 Leak Assessment Report* (RPP-ASMT-53793, Rev 0). Section 4.1.1 of the report states: "In January 2007, as authorized by Schepens (2005), 782 kgal of supernatant from Tank AP-101 was added to Tank AY-102." Section 3.3, Potential Leak Scenarios, 4<sup>th</sup> paragraph of the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10, states: "Once a leak has been identified, all transfers of waste into the leaking tank are terminated and the tank is considered out of service until repaired or replaced." ORP has not added waste to 241-AY-102 since 2007, and there are no plans to intentionally add waste to the tank.

Waste additions to the tank are not being planned. However, due to the requirement to operate the AY Farm ventilation system, a waste transfer from Tank 241-AY-101, through the 241-AY-02A pit, to 241-AZ-101 will be necessary in Fiscal Year 2014. During this transfer, ORP will take all necessary measures to prevent waste from entering 241-AY-102 via the 241-AY-02A pit. Isolating the 241-AY-02A pit from 241-AY-102 in the near term could, however, result in potential nuclear safety concerns. It is possible, if an unplanned leak were to occur from a connector or transfer jumper in the pit during a waste transfer, for waste to drain from the pit, dependent on the volume leaked, into 241-AY-102.

In addition to the waste transfer through the 241-AY-02A pit, other activities take place using raw water or water which has been inhibited with chemicals to prevent corrosion. In an email communication from Cheryl Whalen of Ecology on February 25, 2013, Ecology indicated that water additions would be acceptable, and when adding water, ORP should be closely monitoring releases to secondary containment. As a result, water, or water which has been inhibited with chemicals to prevent corrosion is added to 241-AY-102 as indicated in the following instances:

- Maintenance activities that need to be performed to flush/rinse equipment, and to decontaminate equipment being removed from the tank or pit. Liquid may enter pit 241-AY-02A and ultimately drain into Tank 241-AY-102.
- Performing a leak check of transfer lines through the 241-AY-02A pit using raw water.
- Additions of water to maintain the waste in a safe configuration with sufficient (12-15 inches) supernate cover over the top of sludge.

- Snow melt/rain water intrusions (which have occurred in the past and remain a possibility).

*40 CFR 265.196(a): Cessation of use; prevent flow or addition of wastes. The owner or operator must immediately stop the flow of [dangerous] waste into the tank system or secondary containment system and inspect the system to determine the cause of the release.*

**Analysis:** As stated above, the last transfer in or out of 241-AY-102 occurred in 2007. At this time, ORP is not capable of stopping the leak as the tank contents are covering what is believed to be the source of the leak. *Tank 241-AY-102 Leak Assessment Report* (RPP-ASMT-53793, Rev. 0) concluded that waste had leaked from the bottom of the tank (Section 7.0). This conclusion was based on review of the tank history. Since the bottom of the tank is covered by waste in the tank, the exact location of the leak is currently not known and visual inspection will not be possible until the waste (both sludge and supernatant) can be removed. Inspections completed to date in the annular space between the primary and secondary containment, conclude the walls of the tank have not leaked. Visual inspections in the annular space will continue at the current frequency or as agreed to by Ecology. Ecology has been continuously monitoring the situation during field visits to view annulus video footage.

*40 CFR 265.196(b)(1): If the release was from the tank system, the owner or operator must, within 24 hours after detection of the leak or, if the owner or operator demonstrates that that is not possible, at the earliest practicable time remove as much of the waste as is necessary to prevent further release of [dangerous] waste to the environment and to allow inspection and repair of the tank system to be performed.*

**Analysis:** DOE demonstrated that waste cannot be removed within 24 hours from the primary tank in the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10. At this time, no release into the environment has occurred from Tank 241-AY-102. Efforts are underway to determine the schedule to remove the waste from the primary tank, both supernatant and sludge. Once the waste has been removed from the tank, further inspection of the tank bottom can be conducted and a decision to repair the tank or to close the tank, pursuant to 40 CFR 265.196(e), can be made. ORP will continue to work with Ecology to establish a schedule for removal of the waste from Tank 241-AY-102 such that a decision to repair or close the tank can be made.

*40 CFR 265.196(b)(2): If the release was to a secondary containment system, all released materials must be removed within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment.*

**Analysis:** DOE demonstrated that waste cannot be removed within 24 hours from the secondary containment system in the *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10. At this time, the secondary containment system contains the waste thus preventing it from reaching the environment. The primary action being taken is additional weekly video inspections to evaluate potentially changing conditions.

Additionally, ORP acknowledges the uncertainty that exists with regard to the effects the tank waste may have on the integrity of the secondary containment system over time. A recent report, *Evaluation of the Corrosion Threat of the Waste in the Tank 241-AY-102 Annulus*, RPP-RPT-

54099, Revision 0, December 2012, indicates that additional information may be needed to evaluate the integrity of the secondary containment. Current information on the secondary liner integrity suggests: (1) Pitting corrosion is the most likely mechanism for a primary tank breach, and (2) Secondary containment lifetime should be years, not months, based on aggregated evidence. The latest information supersedes a previously generated evaluation from January 2006, *Stress Corrosion Cracking Evaluation for the Secondary Liner Exposed to In-Specific Waste in a Double-Shell Tank Annulus (RPP-ASMT-27062 Revision 0)*. The sole purpose of the January 2006, evaluation was to demonstrate the secondary liner lifetime was greater than a 10-day emergency response time in order to address a concern raised early in the 2006, Double-Shell Tank System Integrity Assessment. The January 2006, evaluation (RPP-ASMT-27062) will be revised to include: (1) secondary containment integrity discoveries found during the extent of condition inspections of the other six 241-AY, -AZ- and -SY DST System tanks that may affect secondary containment lifetime, and (2) when available, conclusions from the work arising out of RPP-RPT-54099 and RPP-ASMT-56374, Revision 0, *Propensity for Corrosion in the 241-AY-102 Annulus*.

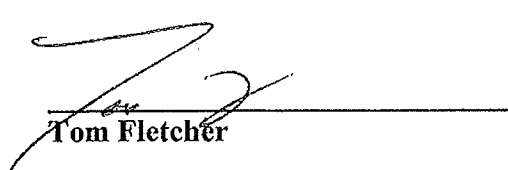




**ATTACHMENT 2**

**13-TF-0024**

**IDENTIFICATION OF ACTIONS TAKEN TO DATE REGARDING DOUBLE-SHELL  
SYSTEM TANK 241-AY-102**



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Tom Fletcher

### Identification of Actions Taken to Date

Since identifying that Tank 241-AY-102 has leaked material from the primary tank to the secondary containment system, ORP and Washington River Protection Solutions LLC (WRPS) have identified, evaluated, and implemented the following actions to prevent harm to human health and the environment:

Removing waste from primary tank: The existing 241-AY-102 pump is available to remove supernatant from the tank if this is determined necessary to reduce the flow of material from the primary tank to the secondary containment. However, removal of the supernatant cannot be completely achieved without introducing a safety issue as there is currently not a mechanism to remove the sludge stored in the tank. The sludge stored in the tank requires a minimum of 12-15 inches of supernatant to support the necessary cooling in the tank due to the heat created by the sludge. Current pumping equipment described in *Double Shell Tank Emergency Pumping Guide*, HNF-3484, Revision 10, is not designed to remove sludge. Modified sluicing technology has been selected to remove the supernatant and sludge from Tank 241-AY-102 in order to make the "repair or close" decision.

Removing waste from secondary containment: Currently there is not enough material in the annulus space for the emergency pumping equipment to remove. Approximately six inches of liquid in the bottom of the annulus needs to be accumulated before the submersible pump would automatically prime upon starting. WRPS will be ready to pump the secondary containment if this quantity is reached as identified in Section 3.3 of the *Double Shell Tank Emergency Pumping Guide*. Readiness actions include: (1) Secondary containment pump testing, (2) Jumper fabrication and testing, (3) Pit readiness to install the pump, and (4) Work package preparation. Efforts to add inhibited solutions to the secondary containment to flush the waste out are not viewed as practical because of waste absorption by the refractory underneath the tank which would unnecessarily spread contamination throughout the refractory. The extent of the spread of contamination in the refractory is not known currently and the risk of additional contamination spread cannot be evaluated. In addition, the effect of rinsing on the current leak rate cannot be predicted until further inspection can be performed to identify the leak location.

Increased visual monitoring: A weekly video inspection through riser 83 of 241-AY-102 annular space will document any changing conditions at the leak accumulation site. These inspections will continue at this frequency until a change is agreed upon with Ecology.

Monitoring/sampling of leak detection pit: Currently, WRPS monitors the level of the leak detection pit on a weekly basis, and removes accumulated liquids from the pit, as necessary. The pit routinely collects other liquids; to date, only low levels of contamination have been detected which do not indicate a leak from the secondary containment system. Accumulated liquids are sampled routinely to confirm that a breach of the secondary containment system has not occurred.